VALUATIONS OF THE IOWA CITY WATER COMPANY BASED ON PRESENT AND PRE-WAR COSTS[1]

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The Iowa City Water Company is a privately owned company. The population of Iowa City is about 12,000, exclusive of 4000 students in attendance at the University of Iowa. The plant was originally installed in 1882. The principal source of supply is from infiltration galleries estimated at about a half-mile in length beneath the bed of the Iowa River. Ten 8-inch flowing wells 160 feet deep contribute a small amount of the water used. At times when these two sources prove inadequate, some water is taken directly from the Iowa River, which is only about 100 feet from the plant.

Plant statistics.—The pumping equipment consists of a Holly quadruplex compound condensing crank and fly-wheel steam pump with a capacity of 1,500,000 gallons, installed in 1882; a Snow duplex direct-acting compound condensing steam pump with a capacity of 2,000,000 gallons, installed in 1889; and an Allis-Chalmers horizontal cross-compound crank and fly-wheel Corliss type high-duty steam pump with a capacity of 3,000,000 gallons, installed in 1914.

In 1909 an iron-removal plant was installed by the New York Continental Jewell Filtration Company. There are two sedimentation basins and four rectangular concrete gravity filter units with a capacity of 2,000,000 gallons per day. This plant, which was originally designed as an iron-removal plant, is now serving also as a filtration plant with coagulation with alum and lime supplemented by sterilization by liquid chlorine.

The distribution system consists of 26.4 miles of mains, 2 to 20 inches in diameter.

[1] Read before the Iowa Section, November 5, 1920. Discussions are invited and should be sent to the Editor.

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The valuations.—Since 1915 four valuations of the Iowa City Water Company have been made. Table 1, Results of Four Valuations of the Physical Property in Use, gives some comparative reproduction values as of April 1, 1920.

In 1915 the company made application to the city council of Iowa City for increased water rates. The city council engaged the author to report upon the value of the property and the rates to which this value entitled the company. Due to the shortness of the time available for the preparation of the report, it was impossible to prepare a complete inventory of the company's property. The company submitted a statement from its books, which indicated that the value of its physical property new was $245,050.

TABLE 1

Results of four valuations of the physical property of the Iowa City Water Company in use

ITEM	COMPANY'S BOOKS, JUNE 25, 1915	REPORT BY H. M. BYLLESBY & CO., AUGUST 1, 1916	REPORT BY J. H. DUNLAP, DECEMBER 31, 1919 (PRE-WAR COSTS)	REPORT BY J. H. DUNLAP, APRIL 1, 1920 (PRESENT COSTS)
Total physical property new.....	$245,050	$332,082	$296,002	$669,833
Depreciation.....	*22,890*	*59,299*	*43,261*	*91,695*
Reproduction value of physical structures.....	222,160	272,783	252,741	578,138
New construction less depreciation to April 1, 1920.....	*18,890*	*7,731*		
Comparative reproduction values as of April 1, 1920.....	241,050	$279,514	$252,741	$578,138

Note: Operating capital and development expense or going value are omitted from tables 1, 2, and 3.

After some investigation it was concluded that this value was a fair one for use in rate-making, but the company was advised to have a complete inventory of its property made as soon as possible. Based upon the company's own estimate of the value of its property, a rate was recommended which was calculated to yield a 7 per cent net return. This rate was accepted by the company with the agreement that it would be tried out to see if the estimated return was received. The new rate was somewhat uncertain in the amount of return, since the company was about to change most of its consumers from the flat rate basis to the meter basis. It is interesting to note that the new rate brought in the estimated revenue and

provided a surplus of $2675 for the year 1916. Part of this surplus, however, was probably due to an energetic campaign for the collection of accounts unpaid in 1915.

In accordance with the recommendation that a complete inventory and valuation be made, H. M. Byllesby & Company, Chicago, were engaged for the work. Under date of August 1, 1916, a report was rendered which gave $332,082 as the value of the total physical property new. Due to the fact that the president of the Iowa City Water Company was soon called to service with his regiment on the Mexican border, no application was made by the company for an increased rate based upon the increase in value over the showing of the company's books in 1915. Following service on the Mexican border, the president of the company was called into action in the war with Germany, with the result that the rate of 1915 remained in force until 1920. In operating during 1917, 1918, and 1919 under this rate, the company lost about $22,000 over what a 7 per cent rate of return would have given. This should be looked upon as part of the contribution of the company to the citizens of Iowa City during the war period.

The new water rates.—In order to prevent further losses, the company engaged the author to make a valuation of its property and to suggest water rates which would yield a fair return. Accordingly he had the interesting opportunity of being in 1915 the engineer for the city council, and in 1919, the engineer for the company. The report made to the company on December 31, 1919, showed that on the basis of pre-war costs, the reproduction value of physical property new was $296,002.

Table 2 based on pre-war costs summarizes the value of the various items of property. The total depreciation of $43,261 was computed by the compound interest method with interest at 4 per cent. The depreciation obtained in this way was checked by a study of the actual condition of the property in use, and wherever necessary was changed to conform with the actual depreciation found on inspection. Subtracting the total depreciation from the pre-war reproduction cost, new, the pre-war reproduction value is found to be $252,741. This is reasonably close to the comparative reproduction value of $241,050 shown in table 1, based on the company's books, and also the comparative reproduction value of $279,514 found by H. M. Byllesby & Company.

TABLE 2

Summary; reproduction value of physical property of the Iowa City Water Company in use, based on pre-war costs

DESCRIPTION	PRE-WAR REPRODUCTION COST	TOTAL DEPRECIATION	PRE-WAR REPRODUCTION VALUE	1920 DEPRECIATION
Real estate	$5,000		$5,000	
Buildings	18,695	$3,123	15,572	$241
Pumping equipment	27,760	12,453	15,307	320
Boiler equipment	7,590	4,927	2,663	255
Water supply and discharge piping	3,973	1,240	2,733	91
Steam piping	1,712	314	1,398	35
Water supply	17,792	3,435	14,357	254
Filter and lime room equipment	21,772	1,375	20,397	222
Mains	112,742	3,630	109,112	273
Fittings	1,545	40	1,505	3
Control valves	4,177	943	3,234	64
Meters	20,684	2,960	17,724	810
Hydrants	10,429	3,552	6,877	256
Paving over mains	3,952	17	3,935	4
Office furniture and fixtures	1,480	222	1,258	100
Tools	2,245	449	1,796	450
Supplies	3,832		3,832	
Vehicles	680	102	578	135
	$266,060	$38,782	$227,278	$3,513
Omissions and contingencies	11,409	1,751	9,658	101
Legal and organization expense	2,661	388	2,273	35
Insurance and taxes during construction	2,195	320	1,875	28
Engineering	5,056	760	4,296	57
	$287,381	$42,001	$245,380	$3,734
Interest during construction	8,621	1,260	7,361	112
Total physical property	$296,002	$43,261	$252,741	$3,846

The water rates in use since 1915 were as follows: Fire hydrants, $45 per annum. Flush tanks, $100 per annum. Water for municipal purposes, free.

Meter rates, payable monthly.

Service charge

	per month
$\frac{5}{8}$-inch meter	$0.50
$\frac{3}{4}$-inch meter	.80
1-inch meter	1.10
$1\frac{1}{4}$-inch meter	1.50
$1\frac{1}{2}$-inch meter	2.00
2-inch meter	3.00
3-inch meter	5.00
4-inch meter	10.00

Output charge

	per 100 cubic feet
Up to and including 5000 cubic feet	$0.10
For the next 45,000 cubic feet	.09
For quantities in excess of 50,000 cubic feet	.06

The report made to the company was transmitted in duplicate to the city council, and set forth in detail the exact reasons for increased rates. As a result of this careful presentation of all the facts involved, the council of Iowa City voted unanimously to allow the company the following increased rates.

All rates to remain the same, except the output charge, which was changed to the following:

Up to and including 5000 cubic feet	$0.20
For the next 45,000 cubic feet	.15
For quantities in excess of 50,000 cubic feet	.10

Valuation based on costs as of April 1, 1920.—Due to the fact that the company wished to issue additional stock, the author was requested to report upon the value of its physical property, based on present costs. Table 3, Summary of Reproduction Value of Physical Property in Use, based on costs as of April 1, 1920, shows that the reproduction cost, new, of the physical property of the company was $669,833. Subtracting the total depreciation, $91,695, gives a present reproduction value of $578,138. This is a value 129 per cent greater than that obtained by using pre-war costs.

In table 4 the pre-war and present costs used in the valuations are compared. It will be observed that the percentage of increase of the present costs over pre-war costs varies from 196 per cent for common red brick in place, to 39 per cent for $\frac{5}{8}$-inch meters installed.

The great difference between the present reproduction value of the physical property of the company based on pre-war costs and

on the costs as of April 1, 1920, is an illustration of the difficulties of valuation work, using the reproduction new less depreciation method, in such general favor with the courts. It is believed that

TABLE 3

Summary; reproduction value of physical property of the Iowa City Water Company in use, based on costs as of April 1, 1920

DESCRIPTION	REPRODUCTION COST	TOTAL DEPRECIATION	PRESENT REPRODUCTION VALUE	1920 DEPRECIATION
Real estate	$6,250		$6,250	
Buildings	41,299	$7,602	33,697	$567
Pumping equipment	59,642	23,847	35,795	697
Boiler equipment	18,467	11,886	6,581	607
Water supply and discharge piping	9,068	2,842	6,226	209
Steam piping	3,423	626	2,797	72
Water supply	38,257	7,480	30,777	549
Filter and lime room equipment	51,038	3,597	47,441	502
Mains	290,086	9,255	280,831	696
Fittings	3,624	101	3,523	7
Control valves	7,616	1,771	5,845	119
Meters	28,448	4,068	24,380	1,109
Hydrants	22,127	7,549	14,578	534
Paving over mains	7,248	29	7,219	7
Furniture and fixtures of office	2,086	298	1,788	81
Tools	3,101	574	2,527	595
Supplies	4,920		4,920	
Vehicles	730	135	595	140
	$597,430	$81,660	$515,770	$6,491
Omissions and contingencies	27,232	3,828	23,404	230
Legal and organization expense	5,974	816	5,158	65
Insurance and taxes during construction	4,939	677	4,262	54
Engineering	11,607	1,613	9,994	114
	$647,182	$88,594	$558,588	$6,954
Interest during construction	22,651	3,101	19,550	243
Total physical property	$669,833	$91,695	$578,138	$7,197

for rate-making purposes some quite different method of valuation will have to be worked out and standardized. In this connection it should be noted that one of the most promising of the new methods recently proposed, is that to be discussed by William G. Ray-

mond, Dean of the College of Applied Science, State University of Iowa, tomorrow morning, under the subject of "Value versus Investment as a Basis for Utility Service Rates." (See JOURNAL, January, 1921.)

TABLE 4

Pre-war and present costs used in the valuations

ITEM	PRE-WAR COSTS	COSTS APRIL 1, 1920	PER CENT INCREASE
Cast iron pipe 6-inch and over including freight and haul	$28.00	$77.00	175
6-inch valves	15.50	26.35	70
12-inch valves	41.50	79.50	92
4-inch hydrants with two 2½-inch nozzles	26.00	58.50	125
6-inch hydrants with steamer nozzles and two 2½-inch nozzles	40.00	90.00	125
⅝-inch meters installed	9.00	12.50	39
Lumber in place	40.00	100.00	150
Common red brick in place	18.00	53.25	196
Concrete footings	8.00	13.25	66
Excavation	0.50	1.00	100
Cross-compound pumps per million gallon capacity	3,800.00	10,000.00	163
Boilers, 72 inches by 18 feet 0 inches, installed	1,400.00	3,800.00	172
Filters per million gallons capacity with all structures	12,000.00	28,600.00	138

Ultimate basis of value.—It is believed that the ultimate basis of value for rate-making purposes is the value of the service performed. While the value of the service performed by a water company is difficult to estimate, yet an indication of this value is found by comparing the rates in various cities supplied with water under somewhat similar conditions.

Table 5 gives the comparative costs of water by meter rates in February, 1920, in twelve cities of Iowa with filtered supplies. It will be observed in this table that the new rates for water in Iowa City are very close to the average rates in the twelve cities. Unless there are special reasons why a local water company should exceed the average rate paid in other cities, it will be very difficult to secure a rate much beyond the average. In any case it is necessary to analyze the situation in the local community and compare it with the situation in other cities, or the local water company will earn a

bad reputation for extortion if it secures a rate much higher than its neighbors. Accordingly, whatever method of valuation may be adopted in the future, it is believed that until increased rates are established in many more cities than have as yet succeeded in obtaining them, it is going to be difficult for one company to break away very far from the average.

TABLE 5

Yearly cost of water by meter rates in twelve cities of Iowa with filtered supplies, February, 1920

PLACE	POPULATION 1915	OWNERSHIP	COST PER YEAR BY METER RATES				
			Minimum	Gallons per day			
				50	100	150	200
Davenport	48,483	Private	*$7.20	$7.20	$10.80	$16.20	$21.60
			†9.00	9.00	12.12	18.18	24.24
Cedar Rapids	40,667	Municipal	10.80	10.80	10.80	13.56	17.88
Council Bluffs	31,354	Municipal	9.00	9.00	12.60	18.90	25.20
Burlington	24,261	Private	12.00	12.00	12.00	16.20	21.60
Ottumwa	22,437	Municipal	9.00	9.00	9.00	13.50	18.00
Keokuk	15,239	Private	6.00	6.48	12.96	19.44	24.84
Iowa City	12,033	Private	*6.00	8.88	11.76	14.64	17.52
			‡6.00	10.80	15.60	20.40	25.20
Fort Madison	9,507	Private	12.00	12.00	21.60	32.40	42.30
Centerville	7,803	Private	6.00	9.00	18.00	27.00	36.00
Creston	7,572	Private	10.00	10.00	12.60	18.90	25.20
Chariton	5,235	Municipal	12.00	12.00	14.40	21.60	27.60
Storm Lake	3,158	Municipal	6.00	6.30	12.60	18.90	24.60
Average of 12 cities			$8.83	$9.39	$13.26	$19.27	$25.20

* Present rate taken for average.

† Proposed rate.

‡ New rate.

Note: In Creston, Chariton and Storm Lake, the consumer owns the meter. In all other cases it is believed the water company owns the meter.

In other words, just so long as such facts as are contained in table 5 must be presented to city councils in Iowa, it is going to be very difficult for any privately owned water company to secure a rate of return in its capital which will enable it to attract new capital from time to time in order to make extensions and improvements. The municipally owned plants are differently situated, since by various methods of municipal accounting, they may, or

may not, be required to yield a fair rate of return on investments. It should be noted, however, that at the present time in the twelve cities listed in table 5, it is impossible to tell by looking at the cost of water, whether the plant is privately owned or municipally owned. This is an indication of the remarkable economies now practiced by privately owned water companies in comparison with municipally owned water companies.